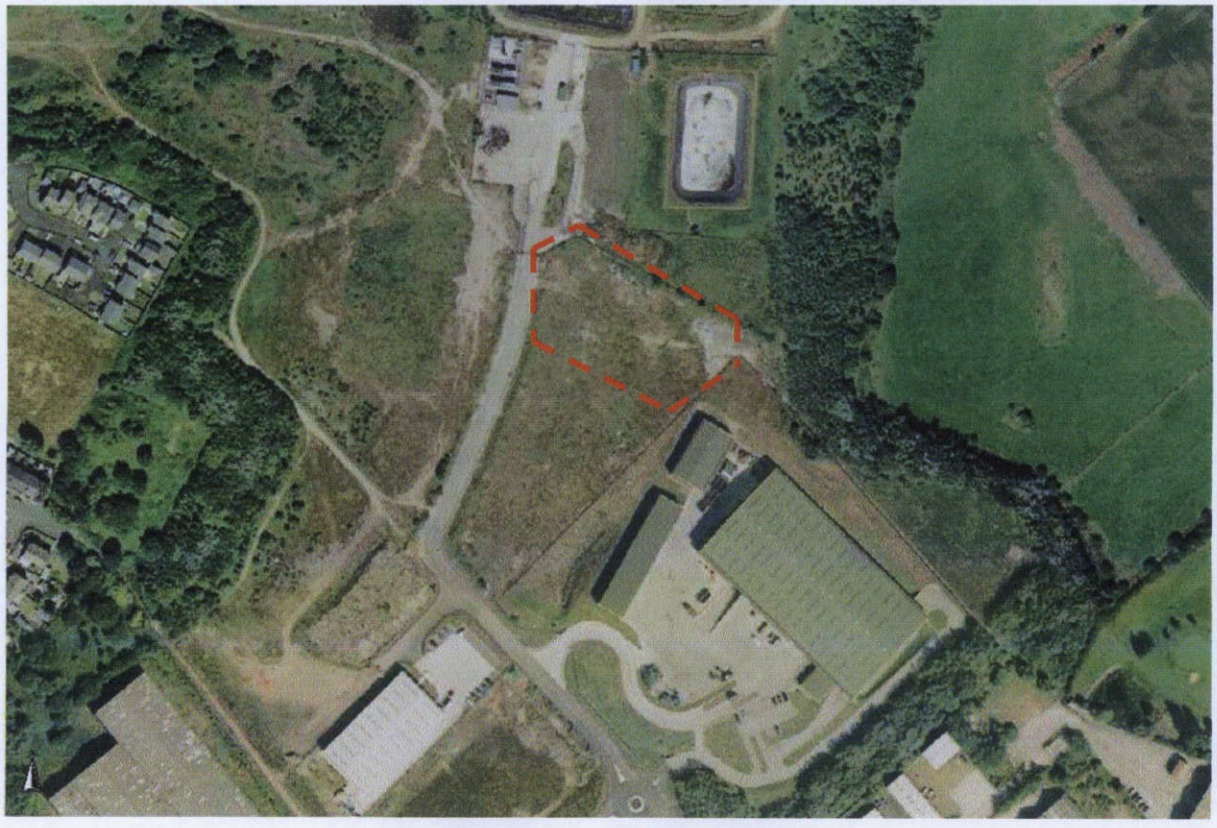
Wigan Council

PLACES DIRECTORATE

ECONOMY, TRADING AND INFRASTRUCTURE DIVISIONS

NEW ORGANICS WASTE TRANSFER STATION

APPENDIX D – ODOUR IMPACT ASSESSMENT



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1.0 Introduction & Scope

1.21.1 The proposed waste transfer station is to be located adjacent to the existing waste recycling centre and Kirkless Landfill compound. The location and site layout of the proposal is detailed in Appendix 1.

1.31.2 The site chosen is located within an existing industrial estate with existing commercial premises in the immediate vicinity. The nearest residential receptor is located approximately 215m to the West on Hemfield Close.

1.41.3 The proposed waste transfer station is to be situated wholly within an industrial building except for the staff car parking, weighbridge and vehicle reception point, vehicle wash off, overnight vehicle storage and plant area.

1.51.4 The applicant has indicated that the facility will employ an air management system to control the odours within the building. For this purpose an air handling system is proposed and is to be situated to the rear of the proposed building on a concrete apron. This system has yet to be designed and no details exist relating to this system.

1.61.5 The facility is for the sole use of the Local Authority and will not take any third party co-mingled waste as I understand it. The facility is therefore likely to operate normal working hours which are likely to be Monday – Friday 07:00 – 17:30 and Saturdays (07:00 – 17:30) to take in missed collections through the week. This includes bank holidays. It is unknown if the air handling equipment is to be operated through-out the night-time. For the purpose of the assessment the assumption is that the air handling unit will be in operation through the night.

1.71.6 The process has been described as the receipt of waste from Council refuse collection wagons from approximately 09:00 onwards, tipping off of refuse into a dedicated bay, handling of material by a front end wheeled loader and then loading of bulk loaders for dispatch to other suitable facilities from around 15:00 onwards.

1.81.7 Refuse wagons will be cleaned and disinfected in a dedicated area that is depicted external to the building before returning to the Makerfield Way depot for overnight storage. No vehicles are expected to be stored on the site except for in an emergency.

1.91.8 It is envisaged the facility will handle approximately 30,000 tonnes per annum, which would equate to approximately 120 tonnes on average per day. Peak levels in June/July and October would expect to reach approximately 250-300tonnes per day.

1.101.9 It is anticipated that to remove the waste would need between 2-5 bulk lorries per day, these are vehicle movements which are already on the wider public highway network but are being diverted from the existing Kirkless WTS to the proposed site. There is no intention to store waste in the building over-night but a contingency of a maximum of 48hours storage has been agreed as a suitable timeframe and is in line with good practice for handling of such a waster stream.

1.10 After discussing the project with the applicant the scope of works required included assessment of fugitive odour emissions from the process. This includes the receipt of waste into the building, fugitive emissions from storage within a dedicated bay, bulk loading, and dispatch and from cleansing of empty vehicles.

2.0 Literature Review

2.1 What is odour?

2.1.1 BS EN 13725:2003[1] defines odour as an organoleptic attribute perceptible by the olfactory organ on sniffing certain volatile substances. Odour is essentially the reaction of a person to chemical compounds within the air[2].

2.1.2 Odour can have both positive and negative reactions depending on the characteristic. Reactions to odours are a learned behaviour in humans and while odours can easily be defined as being positive or negative there is difficulty in quantifying their offensiveness between individuals. It is therefore difficult to attribute single value descriptors to odours in relation to nuisance or annoyance.

2.1.3 In relation to the development the odour source is going to be the decomposition of food and green waste.

2.1.4 From discussions with the Waste Collection Service at Wigan Council the collection of co-mingled food and green waste is scheduled to take place every two weeks. Therefore, it is likely that food/green waste could have been awaiting collection for a maximum of two weeks or longer if collections are missed.

2.1.5 Odour is likely to have already started to form within the residents bin due to anaerobic conditions that may have formed. Therefore on receipt at the waste transfer station the waste could be highly odorous already.

2.2 Methods for Assessment of Odour

2.2.1 The Department of Environment, Food & Rural Affairs (DEFRA) has produced a guide[2] for local authorities on odour. This guidance provides information on the methods to assess odours.

2.2.2 Essentially, odours should be assessed based on qualitative methods and semi-qualitative methods. The methods detailed in the DEFRA guide[2] include, threshold of detection, recognition, intensity, hedonic tone and odour quality & character[2].

2.2.3 The threshold of detection of an odour can be defined as $1ou_E\ m^{-3}$. The $ou_E\ m^3$ unit is the European standard unit for the threshold of detection of odours of a single chemical component and odours with a mix of chemical components. The detection level is based on a panel of people sampling odorous air and then air with no odour. At the level of detection a person is aware of an odour but is not able to recognise the odour and described it.

2.2.4 The level of recognition is also measured in $ou_E\ m^{-3}$. Generally the level of recognition is approximately three times that of the level of detection and therefore is $\approx 3\ ou_E\ m^{-3}$.

2.2.5 The levels of detection and recognition have to be considered in the context of laboratory controlled conditions. The DEFRA guidance[2] provides the following quantification of the European odour unit

- 1 ou_E m^{-3} point of detection in laboratory conditions.
- 5 ou_E m^{-3} faint odour.
- 10 ou_E m^{-3} distinct odour.

2.2.6 Odour emitted into the environment also needs to be considered in relation to existing background concentrations. Background concentrations are a combination of all existing odour sources. Background concentrations can range from 5 ou_E m^{-3} to 60 ou_E m^{-3}.

2.2.7 Intensity, hedonic tone and odour character also an important factor. 2.2.3 – 2.2.6 has outlined a numerical method that attempts quantify the level of odour. The European odour unit does not place a value on the level, for example positive or negative or provide a value in terms of reaction from an exposed person.

2.2.8 Odour intensity refers to the perceived strength of an odour[2] by a person and therefore provides a qualitative measure. The German standard VDI 3882 Part 14[3] outlines a scoring matrix for charactering odour intensity. Table 2.1 outlines the scoring matrix in VDI 3882 Part 14[3].

Table 2.1 – VDI 3882 Part 14 Odour Intensity Matrix

Score	Intensity
0	No odour
1	Very faint odour
2	Faint odour
3	Distinct odour
4	Strong odour
5	Very strong odour

2.2.9 As well as the intensity the hedonic tone is also an important factor in categorising the odour. Hedonic tone is essentially is the odour create positive or negative reactions. For example, perfume or flowers would generally be expected to have a positive hedonic tone, whilst rotting waste or faeces would generally be expected to have negative hedonic tone.

2.2.10 The German standard VDI 3882 Part 2[4] provides a scale for the categorisation of hedonic tone. Table 2.2 details this.

Table 2.2 – VDI 3882 Part 2 Hedonic Tone Matrix

Score	Intensity
+4	Very pleasant
+3	Pleasant
+2	Moderately pleasant
+1	Mildly pleasant
0	Neutral odour / no odour
-1	Mildly unpleasant
-2	Moderately unpleasant
-3	Unpleasant
-4	Very unpleasant

2.2.11 Variation between individuals can have significant affect on the categorisation of different odours using this method.

2.2.12 Finally, odour character is important in making judgements in relation to a particular odour. Odour character can be considered as a description of the odour and is generally the first comment people would make in relation to any odour detected. The character description could either be perceived as a positive, negative or neutral description.

2.2.13 The summation of the intensity, hedonic tone and character all work towards a person's level of annoyance, perceived nuisance and ultimately complaint.

2.2.14 In summary there are two well defined methods for the assessment of odour. These are the European odour unit and the qualitative intensity, hedonic tone and character classifications.

2.3 National Planning Policy Framework, Environmental Permitting and Statutory Nuisance

2.3.1 The overarching control on development is through the planning regime. The National Panning Policy Framework[5] outlines government policy with respect to new developments. The principle message from NPPF[5] is that the presumption with respect to new developments should be in favour of sustainable development.

2.3.2 NPPF[5] clearly states that applications should be determined in accordance with local development plans. Wigan Council adopted the Core Strategy[6] in September 2013. The strategy was open to legal challenge up until the end of October 2013 but in relation to this assessment the Core Strategy has assumed to be adopted.

2.3.3 As part of the Core Strategy lies the Greater Manchester Waste Plan[7]. The waste plan identifies land off Makerfield Way, Ince as being suitable for waste management facilities. Appendix 2 details the location of the identified sites on Makerfield Way.

2.3.4 The proposed development is located within the allocated area for waste management facilities. Therefore, the principle of the land use for waste management facilities is established for this location and therefore the presumption should be in favour of development.

2.3.5 However, NPPF[5] does state that pollution is a material consideration in determining any application. Paragraph 122 states that local planning authorities should assume that specific pollution control regimes will work effectively and that the local planning authority should concern themselves with the principle of the land use rather than specific controls to address specific pollution problems.

2.3.6 With the position in paragraph 122 established and presumption in favour of development in accordance with the Core Strategy regulation of odours is therefore left to directly applicable legislation in terms of statutory nuisance provisions in the Environmental Protection Act 1990[8] and controls under the Environmental Permitting Regulations 2010[9] regime enacted through the Environmental Protection Act 1990[8].

2.3.7 In England odour is generally controlled through two avenues of regulation. These are as a statutory nuisance under the Environmental Protection Act 1990[8] or as part of a permit condition under the Environmental Permitting Regulations 2010[9]. As the proposed facility will require a permit the review of relevant guidance has concentrated on permitting regime.

2.3.8 Guidance on the Environmental Permitting regime has been produced by DEFRA. The guidance[10] outlines the purpose and scope of the Environmental Permitting regime. Effectively the overarching aim of the regime is to protect the environment and human health. The protection of the environment is delivered through continued supervision by regulators in an open and transparent manner.

2.3.9 The regime has several sectors under its control, which includes Waste Framework Directive[11] facilities. It is established that the proposed development will require an environmental permit and therefore the guidance produced by DEFRA is relevant.

2.3.10 The guidance suggests that regulation of facilities should be proportionate to the risk and regulatory effort should be dependent of the operator's performance in mitigating the impact of the facility and controlling the risk. The effort of the regulator should be aimed at securing suitable environmental outcomes within the constraints of the resources available.

2.3.11 The Environment Agency (EA) is the waste regulation authority and is responsible for the effective regulation of the facility. The EA is responsible for issuing and maintaining a public register of permitted facilities and inspecting for compliance with the conditions of the permit.

2.3.12 There are currently two types of permits issued by the EA and these are standard rules and bespoke permits.

2.3.13 Standard rules permit are issued to operators that can demonstrate they meet all the specific criteria. The EA website[12] provides details on what the standard rules are, the generic risk assessments and copies of standard rules permit for specific facilities.

2.3.14 A preliminary discussion with EA Officers indicated that a standard rules permit will not be adequate for the development. The reasons for this is that the generic risk assessment for Household, Commercial & Industrial Waste Transfer in a building[13] parameter 10 states that *"The activities are not carried out predominantly using a limited number of the permitted waste types in a manner which significantly increases any of the risks compared to the generic operation of this type of facility, for example predominantly storing wastes which present a significant increase in fire risk"*. As a standard rules permit is not adequate a bespoke permit will be required.

2.4 Odour Control Techniques

2.4.1 Section 5 of the DEFRA Local Authority guide[2] gives a general overview of odour abatement techniques. The main odour control techniques include good management along with specific odour control technology.

2.4.2 Site management can go a long way to reducing odours on sites by ensuring waste is not left on site for too long and that highly odorous wastes are dealt with immediately in a quarantine area and site surfaces are regularly cleaned and disinfected to ensure that residual material on surfaces does not become a source of emission.

2.4.3 Effective management and engineering controls depend on a thorough understanding of the issue that needs to be controlled. The source-pathway-receptor model is a common tool used to explain and control environmental pollutants from causing harm.

2.4.4 The model works on the principle that if one component (source, pathway, receptor) or a linkage between either is missing then the pollutant can not have an impact. There can be numerous models for a singled process depending on the source, pathway and receptor. Based this model it should be the aim of any method of odour control (management & engineering) to remove or break a linkage to remove the impact.

2.4.5 The DEFRA guidance outlines the principle of an OMP This plan is developed by operators and seeks to anticipate processes that cause the formation of odour and outlines the action that should be taken to deal with the processes.

2.4.6 The OMP is likely to form part of any environmental permit submission. The EA H4 guidance[14] outlines that a permitted facility will need to be operated in accordance with the OMP. It is therefore likely a permit condition will require the production of an OMP for the facility and for this plan to regularly reviewed and updated as the process changes.

2.4.7 The OMP should include the following sections.

- Nomination of person responsible for compliance with the OMP and responsible for updating the OMP.
- Identification of review period for the OMP to ensure the OMP is current and fit for purpose.
- Identification of receptors susceptible to odour.
- Identification of sources of odour.
- Control measures in use on the site (management & engineering).
- Management procedures for each control measures (work instructions).
- Repair and maintenance schedules.
- Monitoring regime in operation.
- Complaint handling system.
- Emergency & incident response systems.
- Staff training records.
- Pro-forma records for accurate and consistent record keeping.

2.4.8 A full OMP is out of the scope of this impact assessment and is the responsibility of the operator to produce. However, an OMP including the sections above and of

sufficient quality will ensure that odours are managed and controlled as to reduce the impact on nearby receptor locations.

2.4.9 Management techniques have been outlined above but the main contributing method to odour control where the source of the odour is highly offensive with a low detection threshold is to employ and end of pipe technique.

2.4.10 End of pipe techniques include the following methods: -

- Physical - containment, dilution, physical adsorption, masking
- Chemical - scrubbing, oxidation, incineration
- Biological - bio-scrubbers, biological, bio-filtration
- Combination of all three

Containment in a Building

2.4.11 Containment of odours will generally consist of measures that restrict the odour to a predetermined space, for example, in a building.

2.4.12 The advantages of containment are that odours can easily be managed within the space ready for treatment via another technique.

2.4.13 To ensure odours are contained some sort of system is required to ensure that leaks are minimised. In buildings, fans are used to draw air out of the building lowering the air pressure which results in air from the outside being drawn in thus containing the odours. The problem with this technique is that the extracted air requires treatment or dispersion from a suitable stack.

2.4.14 Ensuring negative pressure is achievable, but small leaks from the building are likely to occur as there is significant cost in producing a suitably air tight building. Any gaps/openings will result in potential points of release and attention to these areas is required to ensure adequate seals are in place and maintained.

Stack Discharge

2.4.15 Dilution of odours occurs when polluted air is drawn out via an extraction system and passed through a stack of sufficient height to allow the odour to disperse into the atmosphere. Dilution through a stack requires that the efflux velocity and temperature of the plume are sufficient to stop the plume from falling out back to ground level.

2.4.16 Stacks are inherently very simple by design and offer a low cost method of treating odours. Stacks of sufficient height can also be used in conjunction with primary or secondary treatment stages before final discharge to ensure suitable treatment.

2.4.17 Issues with stacks mainly involve planning restrictions and the visual amenity of the stack itself.

Adsorption – Activated Carbon, Pregnated Aluminium Pellets etc...

2.4.18 Adsorption of pollutants in the air is another engineering technique that can be highly effective. Adsorption mainly uses a suitable media (activated carbon, alumina etc...) The process itself is simple in that polluted air is blown through and retained in the filter media for a pre-determined time in order for pollutants to be absorded onto the media.

2.4.19 Activated carbon is generally used for organic odours and gases and works well at lower relative humidity's (<75%) and lower temperatures. Therefore, odours contained in air that is saturated will require pre-treatment with a dehumidifier/air cooler before being passed through the filter.

2.4.20 A dust/coarse mesh filter may also be required to avoid contaminating the filter media with large particles thus reducing the available surface area or contaminating the filter media with greases/oil reducing it porosity.

2.4.21 Activated carbon does result in a waste product once the media has been fully spent. This filter media will need to be disposed of at a suitable disposal site and new activated carbon used to replenish the spent filter media.

Wet Scrubbing

2.4.22 Wet or liquid scrubbing involves entraining the polluted air into contact with a suitable chemical that can react or absorb the pollutant.

2.4.23 Wet-scrubbing methods are typically economical where volumes of air to be treated are >5000m^3.

2.4.24 The principal types of gas absorption equipment include packed towers, plate or tray towers, spray towers, venturi and fluidised-bed scrubbers. Packed towers are usually more effective than simple spray towers.

2.4.25 The most frequently used absorbing solutions are:-

- Sodium hydroxide - ideal for absorbing hydrogen sulphide and mercaptans
- Amine - used to trap hydrogen sulphide or hydrocarbon gases from petroleum refineries;
- Chlorine, sodium hypochlorite, potassium permanganate, ozone or hydrogen Peroxide - effective to absorb unsaturated organic compounds; and
- Diluted sulphuric acid - used to absorb ammonia.

Biofiltration

2.4.26 Bio-filtration is the process by which micro-organisms in a suitable media are used to remove pollutants from polluted air.

2.4.27 Examples of bio-filtration include the treatment of sewage using a reed bed system, the treatment of odours at a maggot production facility[15], at waste management facilities accepting mixed municipal wastes and to a certain extent soil used to cap landfill sites.

2.4.28 The advantages of biolfiltration are that the filter media is relative cheap to renew, the waste product can be easily composted after use (thus reducing waste) and the system can be added to (modular) if further volumes of air need treatment.

2.4.29 Disadvantages of bio-filters mainly surround the health of the micro-organisms. Sufficient moisture and air and a stead temperature are need to be maintain in order for the efficiency of the system to be maintained. Also, compaction of the filter media over time can influence the conditions of the bed thus reducing the efficiency.

2.4.30 Bio-filters are efficient for removing organic odours that are water soluble (i.e. ammonia etc...) and to a lesser extent odours that are partially water soluble. Composting processes often utilise bio-filters.

2.4.31 Information has been obtain from Bio-teg on a bio-filter[16] which is quoted as giving >95% reduction in ou_E/m^3 with odours loads of around 10,000 ou_E/m^3. At this type of efficiency the discharge at the bed would be as a minimum be around 500 ou_E/m^3 depending on the biological health of the filter medium.

Bioscrubbers

2.4.32 Bioscrubbers are a mixture of wet scrubbing and bio-filtration.

2.4.33 They have a mixed level of success in removing odours and are only suitable for removing odours that through adsorption in the water activated sludge mixture.

2.4.34 Maintenance is similar to other biological systems but care must be taken to ensure a constant supply of liquor is critical to ensuring the health of the system.

2.4.35 Bioscrubbers are very effective at the removal of Hydrogen sulphide (H_2S).

Ozone & Ultra Violet (UV)

2.4.36 Ozone and ultra-violet treatment can be effective methods of treatment for odour with studies suggesting up to 70% reduction in odour concentrations for alkenes, amines and organic sulphur compounds.

2.4.37 The process works by injecting ozone and oxygen ions into the odour stream. The oxygen ions and ozone chemical react with the other pollutants in the stream.

2.4.38 Advantages of this method include that it is relatively cheap in installation and in running with a good outcome in terms of the end result.

2.4.39 Disadvantages include the long residence times required for the oxidation to occur (>30secs), which require large treatment chambers that adds to the overall cost. Other disadvantages include health and safety concerns. Exposure to ozone can have significant health affects on humans depending on the exposure concentration[17, 18].

Thermal Oxidation

2.4.40 Thermal oxidation is the treatment of odorous gases through the incineration.

2.4.41 Incineration usually makes use of the waste gas produced in the combustion process. This results in the destruction of the compounds due to the high temperatures.

2.4.42 The advantage of this system includes the complete destruction of the odours as the gas is used up in the combustion process.

2.4.43 There are several disadvantages which include the high capital cost of the plant and the energy costs associated with the combustion process.

2.4.44 The process is well suited to operators who have need for use of heat in an ancillary operation or as part of combined heat & power application.

Plasma (Corona Streamers)

2.4.45 Corona streamers are a highly experimental option and have not been used in any significant applications.

2.4.46 In theory, the process is similar to the ozone/UV oxidation process in that the odour molecules can react with radicals created by the process or through fragmentation due to the high energies produced.

2.4.47 The process is still in development and many barriers still exist to implementing the technology commercially. Yan et al.[19] provides a discussion and overview of the technology and barriers to the implementation commercially.

Odour Neutralising and Counteracting Agents

2.4.48 Odour neutralisation is a system by which a compound with different characteristics to the odour trying to be controlled is introduced to essentially mask the odour.

2.4.49 Advantages of this system are that it is cheap, cost effective and can be effective in masking odours in a small area.

2.4.50 Disadvantages of this technique are that the odour is not treated but merely masked. The risk is that the masking agent added can react with the odours to produce by-products that are equally unpleasant. Furthermore the masking agent does not mask the entire odour plume only portions of it therefore receptors could be exposed to intermittent pleasant and unpleasant odours which could be equally annoying.

2.4.51 Consensus in the industry is that masking agents are to be used in conjunction with other techniques or on small scale processes.

2.5 Consultation with the Environment Agency

2.5.1 A consultation site visit and discussion was held with EA Officers on the 17 October 2013.

2.5.2 Discussions around a suitable permit and appropriate management and engineering methods to control odour was discussed.

2.5.3 No specific guidance on odour abatement techniques was given by the EA but general advice on house-keeping, waste turn-around and management measures in terms of a robust odour management plan were discussed.

2.5.4 It was confirmed a bespoke permit would be required and that the operator of the facility will be required to apply for the permit and develop and odour management plan.

2.5.5 It was considered appropriate that this assessment could outline what was required within an odour abatement management plan but not the specific detail.

2.5.6 The general consensus was the building and some type of air treatment was likely to be sufficient. The EA offered to provide general feedback on any odour abatement technology that was decided upon.

2.5.7 The EA raised the issue of fly control. It was suggested an insecticide be used to control flies on the site. Issues could arise from using insecticides if using a biological method for odour control.

2.6 Specification of Odour Targets

2.6.1 Specifications for odour target levels are not commonly used in the UK.

2.6.2 A novel approach is to use the NOEL (no observed effect level) LOAEL (lowest observed adverse effect level) and SOAEL (significant adverse effect level).

2.6.3 The NOEL, LOAEL and SOAEL descriptors have been widely used in toxicology and have been introduced in Noise Policy Statement for England[20].

2.6.4 No guidance exists on specify what target should be aimed for. In practical terms the NOEL level or less should be aimed for but there is no guidance to suggest what this level is.

2.6.5 EA permits[21] contain conditions that state *"Emissions from the activities shall be free from odour at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved odour management plan, to prevent or where that is not practicable, to minimise, the odour".*

2.6.6 It could be argued that the condition contains elements of NOEL and LOAEL in so far that it states that activities shall be free from likely to cause pollution outside the site unless appropriate measures have been implemented.

2.6.7 Adoption of this method to standardise NOEL and LOAEL is likely to prove difficult as the condition is dependant on the view of the EA officer which the operator will not have continually on site.

2.6.8 Another appropriate measure could be to use the European odour unit. Again no guidance exists to quantify odour units in terms of NOEL, LOAEL and SOAEL. H4 provides guidance that a level of $1.5ou_E/m^3$ maybe an appropriate descriptor. This level would be the level of detection but as already discussed this level is based on laboratory observations and may not be appropriate for the field.

2.6.9 To account for detection error in the field Table 2.3 presents suggested levels as threshold for NOEL, LOAEL and SOAEL. Again there is no guidance that suggests these levels but these are based on consideration of ambient background odours ($5\text{-}60ou_E/m^3$).

Table 2.3 – Recommend European Odour Unit Threshold Values in Relation to NOEL, LOAEL and SOAEL

European Odour Unit (ouE/m3) Threshold Value	Suggested Descriptor
≤10	NOEL
10 – 30	LOAEL
≥ 30	SOAEL

2.6.10 A final measure to quantify NOEL, LOAEL or SOAEL could be to use the characterisation of intensity, hedonic tone and character. The qualitative matrix provided in VD 3882 Part 2 & 14 could be used to define the NOEL, LOAEL and SOAEL level. Table 2.4 – 2.6 details a matrix that could be adopted.

Table 2.4 – NOEL, LOAEL & SOAEL Intensity Matrix

Score	Intensity	Suggested Categorisation
0	No odour	NOEL
1	Very faint odour	
2	Faint odour	LOAEL
3	Distinct odour	
4	Strong odour	SOAEL
5	Very strong odour	

Table 2.5 – NOEL, LOAEL, SOAEL Hedonic Tone Matrix

Score	Intensity	Suggested Categorisation
+4	Very pleasant	LOAEL
+3	Pleasant	
+2	Moderately pleasant	SOAEL
+1	Mildly pleasant	
0	Neutral odour / no odour	NOEL
-1	Mildly unpleasant	LOAEL
-2	Moderately unpleasant	
-3	Unpleasant	SOAEL
-4	Very unpleasant	

Table 2.6 – NOEL, LOAEL, SOAEL Character Matrix

Description	Value Attached	Suggested Categorisation
Positive	Positive	NOEL
	Neutral	LOAEL
	Negative	SOAEL
Neutral	Positive	NOEL
	Neutral	
	Negative	LOAEL
Negative	Positive	
	Neutral	SOAEL
	Negative	

2.6.11 Undertaking the assessment using the VDI 3882 method and assigning value to the outcome in terms of NOEL, LOAEL and SOAEL allows for impacts to be assessed.

2.6.12 For each of the methods to specify values and impacts it is important to understand none of the suggested methods are suggested in any guidance and they are based on interpretation of available guidance and professional judgement on the issue.

2.6.13 It is very difficult to quantify odour and to assign an impact to it. However, it is recommended that the specification should be LOAEL or NOEL in order for odour not to be considered a problem based on one of the above methods.

3.0 Methodology

3.1 This section outlines the methodology used to assess the impact of odour from the proposed development to existing sensitive properties.

3.2 The methodology follows the same principles as the generic risk assessments for standard permits produced by the Environment Agency.

3.3 Appendix 3 provides an example of the type of risk assessment matrix used.

3.4 At the planning stage it has been identified that dispersion modelling is not appropriate as the final air handling unit design is not available. Therefore modelling of such a system will be unreliable and subject to change.

3.5 The qualitative risk assessment identifies the receptor to be protected, source of potential fugitive emissions, the pathway to the receptor and the risk rating with no intervention. Intervention measures are then suggested for risks above medium and then the risk factor is re-evaluated in response to the introduction of the intervention method.

3.6 The risk and impact assessment is undertaken in accordance with the methods outlined in Section 2.

3.7 The residual risk is then assessed in line with recommended standards for odour that are likely to be recommended.

4.0 Qualitative Risk Assessment

Table 4.1 – Qualitative Odour Risk Assessment

Relevant Information				Judgement of Risks				Mitigation Measures	
Receptor	**Source**	**Pathway**	**Harm**	**Probability of Exposure[1]**	**Consequence of Exposure[2]**	**Impact of Risk[3]**	**Justification of Magnitude**	**Possible Remedial Measures**	**Residual Risk**
Local residential population & businesses	Odours from arrival of refuse wagons and receipt of waste in vehicles	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects. Economic effects of businesses moving away from estate.	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development	Vehicles are weighed and enter building immediately upon arrival to reduce time vehicles are stationary outside. No vehicles are parked externally overnight	NOEL
Local residential population & businesses	Tipping of green/food waste	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects. Economic effects of businesses moving away from estate.	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development	Tipping undertaken in building with air treatment technology in place.	NOEL
Local residential population & businesses	Empty refuse vehicles leaving site for storage elsewhere	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects.	High	Medium	SOAEL	Local resident are often sensitive to odour. Likely storage location of the refuse wagons in the Makerfield Way depot which borders onto residential housing.	Refuse wagons are cleaned and disinfected on site at the end of the final tip. Where space permits cleaning and disinfection should take place in the process building.	NOEL

Relevant Information				Judgement of Risks				Mitigation Measures	
Receptor	**Source**	**Pathway**	**Harm**	**Probability of Exposure[1]**	**Consequence of Exposure[2]**	**Impact of Risk[3]**	**Justification of Magnitude**	**Possible Remedial Measures**	**Residual Risk**
Local residential population & businesses	Handling of food/green waste into dedicated bay with wheeled loader for bulking up purposes	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects Economic effects of businesses moving away from estate.	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development	All handling undertaken within a building with air treatment technology in place. Handling of waste is minimised to reduce odours arising from handling/sorting of waste. Refuse wagons should tip close to the dedicated bay as possible.	NOEL
Local residential population & businesses	Storage of food/green waste in dedicated bay	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development	All storage undertaken within a building with air treatment technology in place. Waste is stored for a maximum of 48 hours before it is removed. Waste amounts to be stored at any one time not to exceed designed capacity of the bay and odour abatement system. Emergency plan in place to redirect waste in case of plant malfunction.	NOEL

Relevant Information				Judgement of Risks				Mitigation Measures	
Receptor	**Source**	**Pathway**	**Harm**	**Probability of Exposure[1]**	**Consequence of Exposure[2]**	**Impact of Risk[3]**	**Justification of Magnitude**	**Possible Remedial Measures**	**Residual Risk**
Local residential population & businesses	Loading of food/green waste into bulked loaders	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development	Bulk loading undertaken within a building with air treatment technology in place. Sealed containers to be used for bulk loading and transport off site.	NOEL
Local residential population & businesses	Residual waste on surfaces	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development	Surfaces designed for easy cleaning and disinfection i.e. impermeable. Sealed drainage in place for collection and discharge of effluent to sewer via interceptor. Trade effluent discharge from UU plc required.	NOEL
Local residential population & businesses	Fugitive emissions from openings	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development.	Minimum number of openings dictated by design. All pedestrian access doors on self closing mechanisms and Vehicle doors on fast action systems. Systems in place for no storage, acceptance or	NOEL

								handling of waste whilst doors being serviced.	
Relevant Information				**Judgement of Risks**				**Mitigation Measures**	
Receptor	**Source**	**Pathway**	**Harm**	**Probability of Exposure[1]**	**Consequence of Exposure[2]**	**Impact of Risk[3]**	**Justification of Magnitude**	**Possible Remedial Measures**	**Residual Risk**
Local residential population & businesses	Indeterminable fugitive emissions	Entrainment in air and inhalation	Nuisance and annoyance – possible interminable health affects	Medium	Medium	LOAEL or SOAEL	Local resident are often sensitive to odour and the site is <250m away from nearest receptor. Local business within 250m of the development.	Routine cleaning and disinfection program in operation. Routine monitoring checks undertaken by site staff and recorded with actions taken. Investigation of complaints received via appropriate complaint system. Stages and outcome of investigation recorded.	NOEL

Notes

[1] - Probability of exposure is the likelihood of the receptors being exposed to the hazard. Example definitions include:

- High – exposure is probable: direct exposure likely with no / few barriers between hazard source and receptor;
- Medium – exposure is fairly probable: feasible exposure possible - barriers to exposure less controllable;
- Low – exposure is unlikely: several barriers exist between hazards source and receptors to mitigate against exposure:
- Very Low – exposure is very unlikely: effective, multiple barriers in place to mitigate against exposure.

[2] - The consequences of a hazard being realised may be actual or potential harm. This will include be on a high/medium/low/very low score using attributes and scaling to consider 'harm'.

[3] - Magnitude of the risk is determined by combining the probability with the magnitude of the potential consequences. SOAEL require additional assessment and active management; SOAEL/LOAEL risks require additional assessment and may require active management/monitoring and LOAEL/NOEL and NOEL risks require periodic review.

4.04.0 Qualitative Risk Assessment (cont)

4.1 The assessment in Table 4.1 identifies that if left un-managed odour is likely to have significant adverse affect or adverse affects are likely to be starting to be observed.

4.2 The mitigation options outlined in the risk assessment will manage the risk and the impact to reduce this to where no effect is observed.

4.3 Section 5.0 outlines in greater detail the mitigation options that are recommended.

5.0 Recommended Mitigation Measures

5.1 Specific mitigation measures are needed in order to control odour to acceptable levels.

5.2 Mitigation will include regulatory control through an environmental permit, engineering controls and management methods designed to satisfy the requirements of the environmental permit.

5.3 The following is a list of recommended measures to be included in the detailed design of the facility: -

- Adequate sized wholly enclosed building with minimal air leakage when not under extraction.
- Vehicle access doors to be automatic fast action type from material that can be easily cleaned and disinfected.
- Pedestrian access doors shall be limited to the minimum required for safe entry and egress to/from the building. The pedestrian doors shall be on self closing mechanism.
- Air handling system which will include plant able to keep the building under a slight negative pressure which will include air inlet duct/pipe work and air extract fan/pipe work and monitoring device to ensure negative pressure.
- Air treatment system to be able to treat mainly organic odours. A wet scrubber or bio-filter system would be adequate for this purpose.
- Building surfaces shall be able to be cleaned and disinfected easily i.e. concrete impermeable pavement, painted dwarf brick/block walls, steel/aluminium cladding etc...
- A sealed drainage system within the building connected to foul sewer via an appropriate interceptor[12].
- Vehicle wash-off area on an impermeable pavement, sealed drainage and appropriate interceptor[12]. Ideally the vehicle wash-off shall be located internal to the process building.
- Apply for and comply with requirements of environmental permit.
- Apply for and comply with trade effluent discharge consent.
- Development in collaboration with appointed operator of an odour management plan including the relevant sections identified in 2.4.7.

6.0 Assessment of Residual Odour Impact

6.1 On implementation of the above measures along with continual supervision via the Environmental Permit and Trade Effluent discharge consent imposed by the EA and UU plc respectively there should be in general no observed effect from the facility.

6.2 In the event of observable effects, management procedures will be available so that the source of the emission is identified and the remedial measures outlined in the qualitative risk assessment can be readily implemented.

6.3 It has been previously demonstrated within this odour assessment that odour if managed properly will not give rise to observable effects if handled using appropriate management methods and engineering techniques.

7.0 Conclusions

7.1 A qualitative risk assessment of the likely odour impact has been undertaken for the proposed food/green waste transfer station at Makerfield Way.

7.2 The assessment included a review of relevant literature, policy and specific guidance documents to determine the most appropriate method of assessment, control and specification of target limits.

7.3 It was clear from the literature that assessment methods and targets are inherently difficult to establish. Based on the literature review a combination of assessment via numerical European odour unit and qualitative assessment based on VDI 3882 Part 2 & 14 were appropriate.

7.4 The use of NOEL, LOAEL and SOAEL was also incorporated to add an impact value to the assessment methods. The NOEL value was adopted as the target limit.

7.5 The EA generic risk assessment was adapted to undertake the risk assessment for different sources of odour using the NOEL, LOAEL and SOAEL impact descriptors.

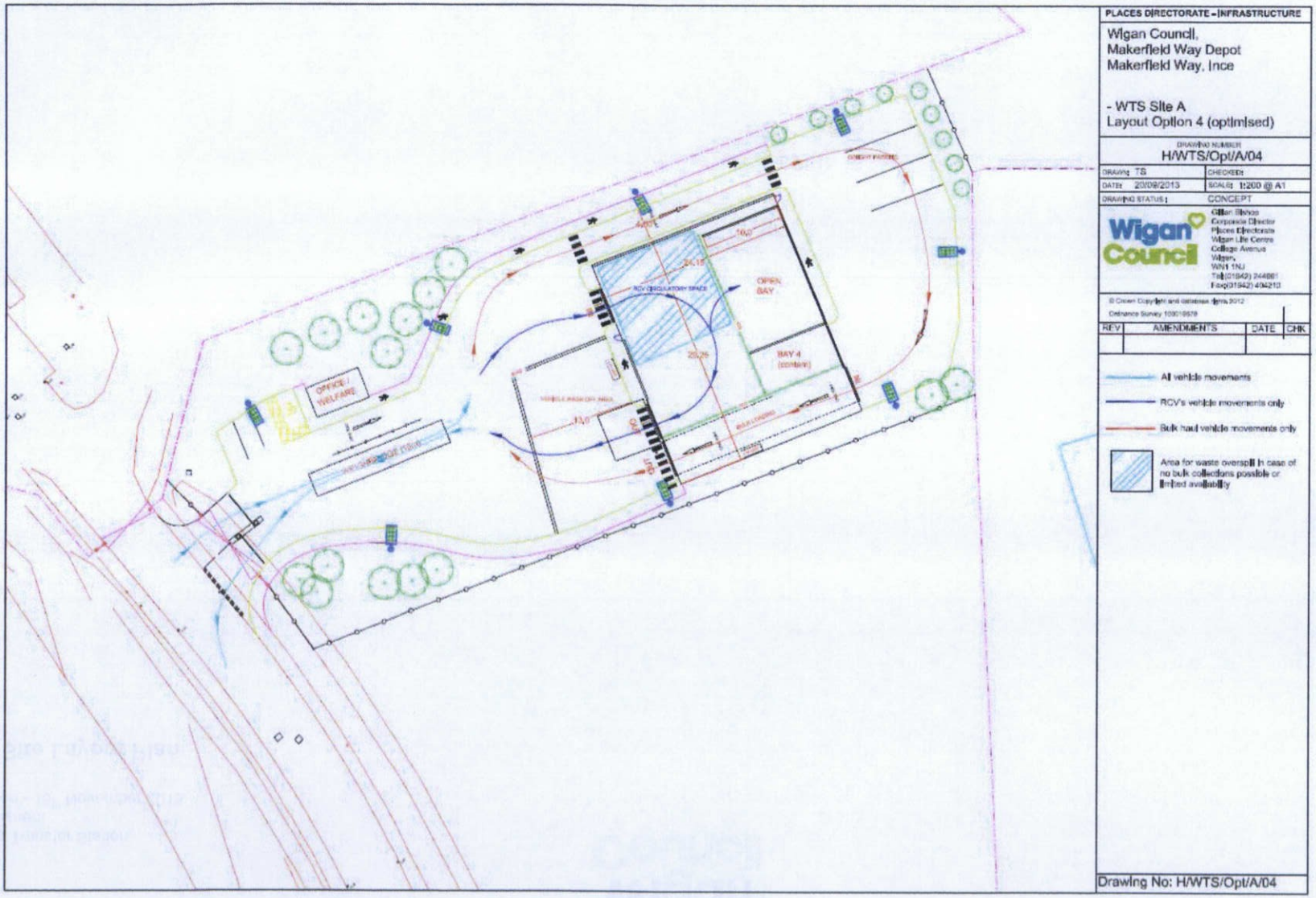
7.6 Without mitigation odours were likely to give rise to LOAEL or SOAEL results which would not be acceptable.

7.7 With mitigation suggested in Section 6.0 the residual risk is in our view NOEL.

7.8 Therefore as long as the mitigation measures are implemented there will be no observed effect on the sensitive receptors identified.

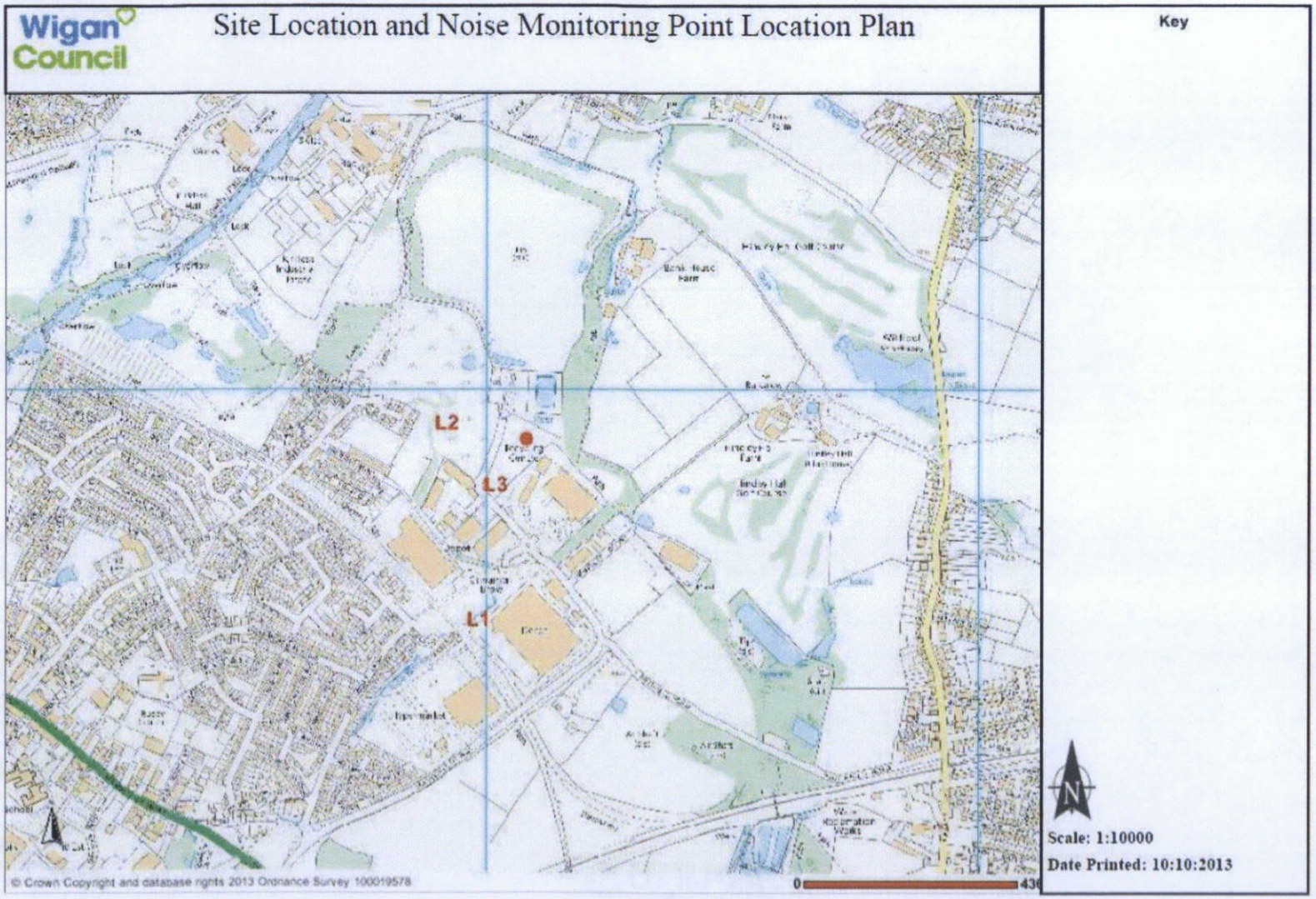
7.9 The mitigation measures can either be encompassed into the Environmental Permit or a planning condition requiring the odour management plan and commission test/inspection is undertaken before the scheme is brought into use.

Appendix A – Site Layout Plan


PLACES DIRECTORATE - INFRASTRUCTURE
Wigan Council,
Makerfield Way Depot
Makerfield Way, Ince
- WTS Site A
Layout Option 4 (optimised)
DRAWING NUMBER
H/WTS/Opt/A/04
DRAWN: TS
CHECKED:
DATE: 20/09/2013
SCALE: 1:200 @ A1
DRAWING STATUS: CONCEPT
Wigan Council
Gillian Bishop
Corporate Director
Places Directorate
Wigan Life Centre
College Avenue
Wigan,
WN1 1NJ
Tel:(01942) 244881
Fax:(01942) 404213
© Crown Copyright and database rights 2012
Ordnance Survey 100019578
REV
AMENDMENTS
DATE
CHK
All vehicle movements
RCV's vehicle movements only
Bulk haul vehicle movements only
Area for waste overspill in case of no bulk collections possible or limited availability
Drawing No: H/WTS/Opt/A/04
OFFICE / WELFARE
OPEN BAY
BAY 4 (contain)
RCV CIRCULATORY SPACE

Appendix B – Location Plan

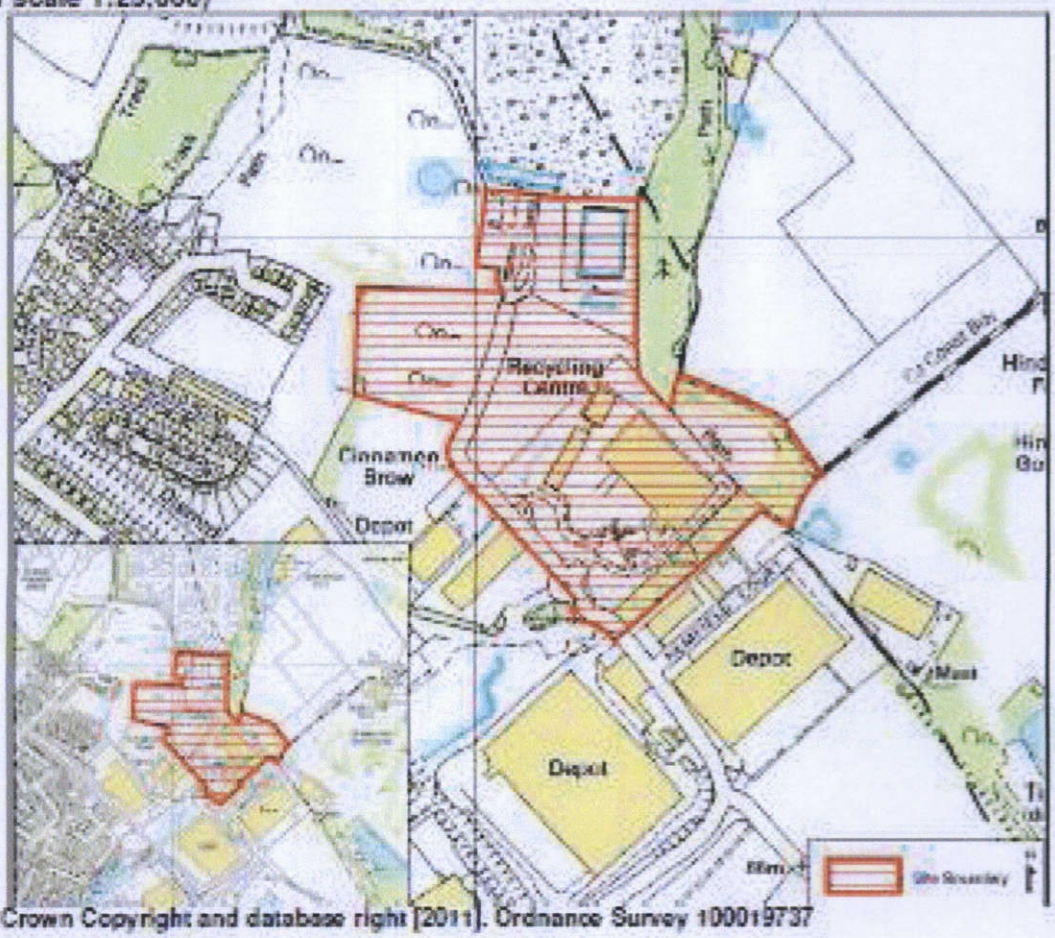
Wigan Council



Appendix C – Greater Manchester Waste Plan – Allocated Boundary Plan

W4 – CA Site Makerfield Way (Aka Kirkless)

1:5,000 map of site showing site outline over MasterMap base layer (insert map is of scale 1:25,000)



Appenidx D – Example EA Generic Risk Assessment

Risk assessment is for HCl waste transfer station in a building SR2008No1 v4

Data and information				Judgement				Action (by permitting)	
Receptor	**Source**	**Harm**	**Pathway**	**Probability of exposure**	**Consequence**	**Magnitude of risk**	**Justification for magnitude**	**Risk management**	**Residual risk**
What is at risk? What do I wish to protect?	**What is the agent or process with potential to cause harm?**	**What are the harmful consequences if things go wrong?**	**How might the receptor come into contact with the source?**	**How likely is this contact?**	**How severe will the consequences be if this occurs?**	**What is the overall magnitude of the risk?**	**On what did I base my judgement?**	**How can I best manage the risk to reduce the magnitude?**	**What is the magnitude of the risk after management? (This residual risk will be controlled by Compliance Assessment).**
Local human population	Releases of particulate matter (dusts) and micro-organisms (bioaerosols).	Harm to human health - respiratory irritation and illness.	Air transport then inhalation.	Medium	Medium	Medium	Permitted waste types do not include …. dusts, powders or loose fibres so only a medium magnitude risk is estimated. There is potential for exposure if anyone is living or working close to the site (apart from the operator and employees)	SR (emissions of substances not controlled by emission limits - buildings). SR (if required) - emissions management plan.	Low

Local human population	As above	Nuisance - dust on cars, clothing etc.	Air transport then deposition	Medium	Low	Low	Local residents often sensitive to dust.	As above	Very low
Local human population, livestock and wildlife.	Litter	Nuisance, loss of amenity and harm to animal health	Air transport then deposition	Medium	Medium	Medium	Local residents often sensitive to litter.	As above. Appropriate measures could include clearing litter arising from the activities from affected areas outside the site.	Very low
Local human population	Waste, litter and mud on local roads	Nuisance, loss of amenity, road traffic accidents.	Vehicles entering and leaving site.	Medium	Medium	Medium	Road safety, local residents often sensitive to mud on roads.	As above. Appropriate measures could include clearing waste, litter and mud arising from the activities from affected areas outside the site.	Low
Local human population	Odour	Nuisance, loss of amenity	Air transport then inhalation.	Medium	Medium	Medium	Local residents often sensitive to odour.	SR - emissions shall be free from odour…. SR (if required) - odour management plan. Odour will be restricted by SR (emissions of substances not controlled by emission limits - buildings).	Low

Local human population	Noise and vibration	Nuisance, loss of amenity, loss of sleep.	Noise through the air and vibration through the ground.	Medium	Medium	Medium	Local residents often sensitive to noise and vibration	SR - emissions shall be free from noise and vibration..... SR (if required) - noise and vibration management plan. Noise will be restricted by SR (emissions of substances not controlled by emission limits - buildings).	Low
Local human population	Scavenging animals and scavenging birds	Harm to human health - from waste carried off site and faeces. Nuisance and loss of amenity.	Air transport and over land	Medium	Medium	Medium	Permitted wastes may attract scavenging animals and birds. Specified low-risk wastes stored outside may become nesting / breeding sites.	SR - emissions of substances not controlled by emission limits (including those from scavenging animals, scavenging birds and other pests) shall not cause pollution.....Access to waste is restricted by SR (emissions of substances not controlled by emission limits - buildings).	Very low
Local human population	Pests (e.g. flies)	Harm to human health, nuisance, loss of amenity	Air transport and over land	Medium	Medium	Medium	Insect pests can multiply on permitted wastes, particularly in summer months	As above	Low

Local human population and local environment	Flooding of site	If waste is washed off site it may contaminate buildings / gardens / natural habitats downstream.	Flood waters	Low	Medium	Low	Permitted waste types are non-hazardous so any waste washed off site will add to the volume of the local post-flood clean up workload, rather than the hazard.	SR - management system (will include flood risk management). Waste washed off site restricted by SR (emissions of substances not controlled by emission limits - buildings).	Very low
Local human population and / or livestock after gaining unauthorised access to the waste operation	All on-site hazards: wastes; machinery and vehicles.	Bodily injury	Direct physical contact	Medium	Medium	Medium	Permitted waste types are non-hazardous so only a medium magnitude risk is estimated.	SR - activities shall be managed and operated in accordance with a management system (will include site security measures to prevent unauthorised access). Access to waste restricted by SR (emissions of substances not controlled by emission limits - buildings).	Low

Local human population and local environment.	Arson and / or vandalism causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff, firefighters or arsonists/vandals. Pollution of water or land.	Air transport of smoke. Spillages and contaminated firewater by direct run-off from site and via surface water drains and ditches.	Medium	Medium	Medium	Permitted waste types do not include sludges or liquids and are non-hazardous so only a medium magnitude risk is estimated.	As above. SR - management system (will include fire and spillages). Spread of fire restricted by SR (emissions of substances not controlled by emission limits - buildings). SR - tyre storage no more than 50 tonnes.	Low
Local human population and local environment	Accidental fire causing the release of polluting materials to air (smoke or fumes), water or land.	Respiratory irritation, illness and nuisance to local population. Injury to staff or firefighters. Pollution of water or land.	As above.	Medium	Medium	Medium	Risk of accidental combustion of waste is moderate.	As above (excluding comments on access to waste). Permitted activities do not include the burning of waste.	Low
All surface waters close to and downstream of site.	Spillage of liquids, leachate from waste, contaminated rainwater run-off from waste e.g. containing suspended solids.	Acute effects: oxygen depletion, fish kill and algal blooms	Direct run-off from site across ground surface, via surface water drains, ditches etc.	Medium	Medium	Medium	Permitted waste types do not include sludges or liquids so only a medium magnitude risk is estimated. There is potential for contaminated rainwater run-off from wastes stored outside buildings especially during heavy rain.	SR - all liquids shall be provided with secondary containment.... (applies to non-wastes such as fuels). Run-off restricted by SR (emissions of substances not controlled by emission limits - buildings).	Very low

All surface waters close to and downstream of site.	As above	Chronic effects: deterioration of water quality	As above. Indirect run-off via the soil layer	Medium	Low	Low	Waste types are non-hazardous so harm is likely to be temporary and reversible.	As above	Low
Abstraction from watercourse downstream of facility (for agricultural or potable use).	As above	Acute effects, closure of abstraction intakes.	Direct run-off from site across ground surface, via surface water drains, ditches etc. then abstraction.	Medium	Medium	Medium	Watercourse must have medium / high flow for abstraction to be permitted, which will dilute contaminated run-off.	As above	Low
Groundwater	As above	Chronic effects: contamination of groundwater, requiring treatment of water or closure of borehole.	Transport through soil/groundwater then extraction at borehole.	Medium	Medium	Medium	There is a potential for contaminated rainwater run-off or leachate from permitted waste types.	As above. Also the permitted activities shall not be within 50m of any well, spring, or borehole used for the supply of water for human consumption. This must include private water supplies.	Low
Local human population	Contaminated waters used for recreational purposes	Harm to human health - skin damage or gastro-intestinal illness.	Direct contact or ingestion	Low	Medium	Low	Unlikely to occur, but might restrict recreational use.	SR (emissions of substances not controlled by emission limits - buildings). SR (if required) - emissions management plan.	Very low

Protected sites - European sites and SSSIs	Any	Harm to protected site through toxic contamination, nutrient enrichment, smothering, disturbance, predation etc.	Any	Low	Medium	Low	Waste operations may cause harm to and deterioration of nature conservation sites.	SR (emissions of substances not controlled by emission limits - buildings). SR - activities shall not be carried out within 200m of a European Site or SSSI. (Distance criteria as agreed with Natural England / Countryside Council for Wales)	Low

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